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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,043	08/10/2006	Hideki Oki	S1459.70129US00	4064

23628 7590 01/05/2010
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EXAMINER	
BEST, ZACHARY P	
ART UNIT	PAPER NUMBER
1795	
MAIL DATE	DELIVERY MODE
01/05/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/589,043	OKI ET AL.	
	Examiner	Art Unit	
	Zachary Best	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 September 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

ELECTROCHEMICAL DEVICE AND ELECTRODE SUITABLE FOR USE IN PRIMARY AND/OR SECONDARY BATTERIES

Examiner: Z. Best S.N. 10/589,043 Art Unit: 1795

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 14, 2009 has been entered. Claims 1, 10, and 12-13 were amended. Claims 1-20 are currently pending examination.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

3. The rejections under 35 U.S.C. 112, first paragraph, of Claims 1-20 are withdrawn because Claims 1 and 10 were amended, and the rejections under 35 U.S.C. 112, second paragraph of Claims 12-13 are withdrawn because Claims 12-13 were amended.

4. Claims 1-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant claims "the battery reaction causes no observable changes in lattice parameters of the active material." However, this claim limitation is not supported in the instant specification. Examiner notes page 14, lines 9-17 which recites that the crystal structure and crystal state remained unchanged. This discussion is not so specific to say that there are "no observable changes in lattice parameters." Applicant in the Response filed September 14, 2009 noted that Hoffman et al. discussed no change in crystal structure, which Applicant argues is not the same as no change in lattice parameters, but then Applicant argues that the specification conveys an unchanging lattice parameter by merely discussing crystal structures and states. Regardless, it is Examiner's position that the specification does not convey with specificity to the lattice parameters to show that Applicant possessed the claimed invention at the time of filing to support the aforesaid claim limitation.

5. Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Applicant appears to claim a broad genus of electrochemical cells based on the specification, page 14, lines 9-17, which only refers to the active material from Examples 1 and 2 (CoS and CoO) and the characteristics found therein. The specification does not relate the entire genus, as claimed, and its characteristics to the two examples. It is therefore, Examiner's position that one skilled in the art would not be enabled to create the invention having an active material of at least one element from 1B Group, 2B Group, 6A Group, 7A Group, or 8 Group of a short-form periodic table such that the active material exhibits ionic interactions only on external surfaces of the particles of the active material without observable changes to the lattice parameters of the active material.

6. Claim 1-9 and 12-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "observable" in Claim 1 is a relative term which renders the claim indefinite. The term "observable" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Examiner notes the specification, page 14, lines 9-17, which states that Applicant observed no change in the crystal structure or crystal state, but this does not convey how one skilled in the art would observe the lattice parameters or crystal structure. If there are no changes in the lattice parameter or crystal structure, the claims should read as such, and if there are "minor

variations" that were merely overlooked by Applicant (i.e., unobserved) then it should be definitively claimed that changed do occur.

Claim Rejections - 35 USC § 103

7. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman et al. (US 4,894,302) in view of Mayes et al (US 2002/0048706 A1).

Regarding Claim 1, Hoffman et al. teach an electrochemical device, which comprises a first pole (3), a second pole (2), and an ionic conductor (4), wherein said first pole containing an active material comprising Ru or Co (col. 5, lines 61-65, Group 8), and said ionic conductor containing Mg, Al, or Ca (Hoffman et al. claims 1-2), wherein the lattice parameters are substantially unchanged (col. 7, lines 3-8). However, Hoffman et al. fail to teach said active material has an average particle diameter as small as 1 nanometer.

Mayes et al. teach an electrochemical cell comprising an electrochemical reaction wherein an ion conductive species is intercalated into a host material during the electrochemical reaction (par. 7), wherein the ion host particles preferably less than 10 nm in diameter because the use of finer particles minimizes the detrimental effects of volume change occurring naturally during the intercalation of the ion conductive species (par. 106). Mayes et al. further suggest the ion conductive species may be calcium or magnesium ions (par. 103). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the active material of Hoffman et al. have an average particle diameter as small as 1 nm Mayes et al. teach that smaller particle sizes in

electrochemical cells where intercalation occurs minimize the detrimental effects of volume change of the host material. Discovery of an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272 (CCPA 1980).

While Hoffman et al. in view of Mayes et al. do not specifically teach "the ionic conductor interacting… only on external surfaces of the particles... [with] no observable changes in lattice parameters of the active material" it is Examiner's position the electrochemical device of Hoffman et al. in view of Mayes et al. as described above anticipates this feature because there is no change in the crystal structure or crystal state (see Applicant's specification, pg. 14, lines 9-17). A reference that is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. *In Re Roberston* 49 USPQ2d 1949 (1999).

Regarding Claim 2, Hoffman et al. teach the electrochemical device of the first pole is managenese oxide or cobalt oxide (col. 5, lines 65-68).

Regarding Claim 3, Hoffman et al. teach said cobalt oxide (Co_3O_4), which has a ratio of M/X of 0.75.

Regarding Claim 4, Mayes et al. teach the active material particle size is about 30 nm or preferably smaller than 10 nm (par. 106).

Regarding Claim 5, Hoffman et al. teach the first pole is formed from the active material mixed with a conductive material and a polymeric binder (col. 6, lines 3-14).

Regarding Claim 6, Hoffman et al. teach said ions from the ionic conductor are Mg, Al, or Ca (Hoffman et al. claims 1-2).

Regarding Claim 7, Hoffman et al. teach said second pole contains magnesium or calcium (Hoffman et al. claim 2).

Regarding Claim 8, Hoffman et al. teach said ionic conductor is an electrolytic solution (Hoffman et al. abstract) or suggest a solid electrolyte (col. 2, lines 59-62).

Regarding Claim 9, Hoffman et al. teach said electrochemical device is a secondary battery (rechargeable, col. 1, lines 37-39).

Regarding Claim 10, Hoffman et al. teach an electrochemical device, which comprises a first pole (3), a second pole (2), and an ionic conductor (4), wherein said first pole containing an active material comprises managenese oxide or cobalt oxide (col. 5, lines 61-68, Group 8), and said ionic conductor containing Mg, Al, or Ca (Hoffman et al. claims 1-2). However, Hoffman et al. fail to teach said active material has an average particle diameter as small as 1 nanometer.

Mayes et al. teach an electrochemical cell comprising an electrochemical reaction wherein an ion conductive species is intercalated into a host material during the electrochemical reaction (par. 7), wherein the ion host particles preferably less than 10 nm in diameter because the use of finer particles minimizes the detrimental effects of volume change occuring naturally during the intercalation of the ion conductive species (par. 106). Mayes et al. further suggest the ion conductive species may be calcium or magnesium ions (par. 103). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the active material of Hoffman et al. have an average particle diameter as small as 1 nm because Mayes et al. teach that smaller particle

sizes in electrochemical cells where intercalation occurs minimize the detrimental effects of volume change of the host material. Discovery of an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272 (CCPA 1980).

While Hoffman et al. in view of Mayes et al. do not specifically teach "the ionic conductor interacting… only on external surfaces of the particles... [with] no observable changes in lattice parameters of the active material" it is Examiner's position the electrochemical device of Hoffman et al. in view of Mayes et al. as described above anticipates this feature because there is no change in the crystal structure or crystal state (see Applicant's specification, pg. 14, lines 9-17). A reference that is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. *In Re Roberston* 49 USPQ2d 1949 (1999).

Regarding Claim 11, Hoffman et al. suggest that the active material is a mixture of a plurality of compounds ("at least one"), each of the plurality of compounds being represented by the general formula MX (col. 5, lines 61-68).

Regarding Claims 12-13, Hoffman et al. teaches the intercalation occurs to a degree of a maximum characteristic for each host structure, and beyond said degree the crystal structure will change, which is detrimental to the material (col. 7, lines 9-21). It is reasoned that if the crystal structure remains unchanged the crystal state will also remain unchanged because a change in crystal state would inherently change the crystal structure.

Regarding Claims 14-15, Hoffman et al. teach said active material is manganese oxide (Mn_2O_3), which has a ratio of M/X of 0.66.

Regarding Claims 16-17, Mayes et al. teach the active material particle size is about 30 nm or preferably smaller than 10 nm (par. 106).

Regarding Claim 18, Hoffman et al. teach said ions from the ionic conductor are Mg, Al, or Ca (Hoffman et al. claims 1-2).

Regarding Claim 19, Hoffman et al. teach said second pole contains magnesium or calcium (Hoffman et al. claim 2).

Regarding Claim 20, Hoffman et al. teach the first pole is formed from the active material mixed with a conductive material and a polymeric binder (col. 6, lines 3-14).

Response to Arguments

8. Applicant's arguments filed on March 26, 2009 have been fully considered, but they are not persuasive.

Applicant argues:

(a) *the intercalation reactions are different from the reaction of Applicant's invention.*

In response to Applicant's arguments:

(a) At the outset, it appears that Applicant argues that the mere use of "intercalation" as a reaction term disparages the prior art from the claimed invention. It is noted that Applicant uses the term "occlusion" throughout the specification, while thoroughly avoiding any mention of the term "intercalation." In the battery arts it is well known that intercalation is a form of occlusion (e.g., Suzuki et al., U.S. 7,608,366 B2, col. 1, line 60 – col.

2, line 3). However, Applicant never describes the occlusion reaction except to posit that the unobservable change in crystal structure and crystal state suggests that reactions occur only on the surface of the active material.

Examiner notes the discussion by Hoffman et al. and Mayes et al. as pointed out by Applicant in the Response filed September 14, 2009, however in that discussion Hoffman et al. does not take in to account the nano-sized particles of Mayes et al., and the discussion of Mayes et al. is concerned with lithium ions. In other words, Mayes et al. may not have observed the same effects that Applicant claims where, for example, magnesium ions are involved. Given the same materials and particle sizes as is claimed by Applicant, it is Examiner's position that the surface occlusion feature and lattice parameter feature as claimed would be inherent in the electrochemical device of Hoffman et al. in view of Mayes et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary Best whose telephone number is (571) 270-3963. The examiner can normally be reached on Monday to Thursday, 7:30 - 5:00 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Zachary Best/
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795